



### Site 328 Rings Island – First Street and March Road

**Overview:** The Rings Island – First Street and March Road potential restoration site is located on the western end of Rings Island approximately 330 ft east of the intersection with Route 1 in Salisbury. The potential restoration site encompasses approximately 5 acres of degraded former salt marsh which is currently dominated by *Phragmites*. The potential restoration site is located upstream of two small culvert crossings under both First Street and March Road. First Road is an early town road and shown on the 1894 USGS Newburyport-Exeter, NH-MA Quadrangle map. March Road was constructed at a much later period of time. The creek within the potential restoration site is an unnamed tributary which flows southerly directly to the Merrimack River between two marinas. Ditching within the potential restoration site extends to the north and joins the Rings Island - Ferry Road Site (Site 329), although flow between the potential restoration sites is limited by the size and condition of the connecting ditches. During major coastal flooding events, as witnessed on May 25<sup>th</sup> and 26<sup>th</sup> of this year, water overtops the roadways which separate both sites from the Merrimack River. Both the small size and poor condition of the two small culverts downstream of the First Street/March Road potential restoration site restrict tidal exchange during all tides. Tide gauge data collected in mid-May to early June documented a maximum restriction of nearly 3.0 feet during a major storm event. A restriction of approximately 0.4 ft occurs during typical spring tide conditions. Other evidence of a tidal restriction at this location includes minor scour pools within the median wetland area and a pronounced decrease in the typical dimensions of the creek upstream of March Street. The approximate width of the channel is 6 ft upstream of March Street and 15 ft downstream of First Street.

The restoration area is privately owned and not in conservation status. The roadway right-of-ways are municipally owned.

**Structure conditions:** Both ends of the existing culvert under First Street are obscured by riprap and accumulate wrack and debris which prevented visual inspection. The approximate length of the culvert is 40 ft. The culvert appears to be a severely deteriorated timber box culvert of unknown dimensions. The likely original size of the structure is 4 ft by 2 ft (D. Levesque, DPW Director, pers. comm.). Overall, the culvert is considered to be in poor or failed condition. A more thorough inspection would require cleaning and maintenance at the inverts. The life expectancy of the culvert is less than 5 years. First Street is approximately 26 ft wide with a sidewalk on the downstream side of the road and cable guardrail on both sides. The roadway is showing minor signs of collapsing near the culvert but is in fair overall condition with recent major patching of the roadway surface.

The second culvert is an 18 in RCP culvert under March Road. The downstream end of the culvert is located within the triangular-shaped marsh within the median between the two roads. The upstream end of the pipe connects to a linear ditch which parallels March Street for approximately 95 ft before veering to the north. The downstream end of the culvert is protected by a concrete end section while the upstream end has no protection from scour or erosion. The approximate length of the culvert is 53 ft. Overall, the 18 in culvert under March Street is in fair condition with a life expectancy of over 25 years. March Street is approximately 30 ft wide with broad shoulders and cable guardrail on both sides. The roadway is in good condition.

**Ecological Integrity:** Due to prevalence of *Phragmites*, the potential restoration site is considered to have a low level of ecological integrity. The potential restoration site is not held in conservation, however portions of the adjacent site (Site 329) are state-owned. The potential restoration site is contained within BioMap Core Habitat and Estimated Habitat for Rare Wildlife. The potential restoration site does not fall within an ACEC. Surrounding land uses are high



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density residential and commercial. Both Sites 328 and 329 include relatively large stands of *Phragmites* and are therefore considered to be in a degraded condition. However, there are also extensive stands of *Phragmites* within unrestricted portions of the marsh downstream of the road crossings. A smaller stand of *Typha* also occurs immediately downstream of First Street. Therefore, the ability to reduce or control the advance of *Phragmites* by reducing the existing tidal restriction is questionable.

The obstructed flow path through the culvert under First Street likely limits upstream fish passage. The Merrimack River downstream of the potential restoration site is mapped as suitable habitat for blue mussel and soft-shelled clam.

Two tide gauges were deployed from May 18 to June 3, 2005 upstream of the culvert under March Road and downstream of the culvert under First Street. Results of the gauge deployment show a significant restriction of tidal flow through the culverts which increases with tidal prism. These restrictions occurred during all of the 29 tidal cycles recorded for this deployment. Tidal restrictions ranged from 0.43-2.83 ft and delays ranged from 35 min to 1 hr 5 min. The highest recorded tide downstream of the culvert occurred during a major coastal storm on May 26 at 1:49 AM at an NGVD adjusted height of 8.98 ft. Upstream high tide occurred at 2:54 AM at an adjusted height of 6.15 ft. During the peak of the tidal cycle, the roadway system was overtopped causing a pronounced delay in the ebb tide upstream of March Road. The resulting tidal dampening was 2.83 ft. and a delay of 1 hr 5 minutes. The dampening amounted to approximately 33% of the total tidal prism recorded at the downstream gauge. The dampening effect provided flood protection to relatively low-lying properties along First Street and Route 1. The tidal restriction during more typical spring tide conditions (similar to the tide which reached elevation 5.5 ft on May 22<sup>nd</sup>) is approximately 0.4 ft.

Relatively low salinities of 1.0 and 1.5 ppt (downstream and upstream, respectively) were recorded on a near slack, ebbing tide. Previous salinity measurements by the WRP also found higher salinity levels upstream of the roadways. These values are indicative of significant freshwater contributions to the marsh system, especially during spring conditions. The very low salinities may also be attributable to fresh water contributions from the Merrimack River.

The overall severity of the existing impairments within this portion of the marsh system is considered severe. The replacement of the existing culverts with a larger structures set lower in the channel would reduce the tidal restriction and the observed bank erosion observed upstream of March Road. The density of the *Phragmites* in the vicinity of March Road prohibited the collection of an adequate sample of biological benchmarks, however, the site does not appear to exhibit signs of major subsidence. Even with additional ditching within the potential restoration site to increase tidal exchange and draining of fresh water which likely accumulates within the site, the ability to control the spread of *Phragmites* is questionable. However, an increase in tidal amplitude and improved fish passage with replacement culverts will increase available habitat for foraging fish. An alleviation of the tidal restriction will also allow the marsh plain to increase in elevation in response to rises in sea level and more effectively discharge freshwater contributions to the marsh from groundwater and surrounding development. No conversion of other brackish or fresh water wetlands are anticipated. Additional study is needed to evaluate the impact of increased tidal exchange on low-lying properties.

**Socioeconomic:** Recreational values of the potential restoration site are reduced by poor access, lack of parking and private ownership status. There are limited educational opportunities due to the lack of nearby schools or ongoing research. The potential restoration site's Uniqueness/Heritage value is enhanced by its listing as supporting State-listed wildlife. The



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potential restoration site does not include any known cultural resource elements or urban setting values.

**Construction Logistics/Feasibility:** The overall constructability at either First Street or March Road is considered medium. Construction constraints at both potential restoration sites include overhead utilities and underground sewer, water, telephone and gas lines. There is also reports of a gas line through the wetland which was encountered during past mosquito control efforts. Construction estimates have been increased for this potential restoration site to cover utility relocation costs. Additional research and survey is required to determine the elevations of these utilities and their possible conflicts with a larger culvert. The basement elevation of the closest abutter on First Street is approximately 7.3 ft NGVD or slightly below the low point of First Street. The Army Corps estimated one year frequency flood elevation is approximately 7.0 NGVD. Increases in tidal exchange will need to consider potential impacts to this low-lying property as well as others along Route 1A. However, increased tidal exchange during typical spring tide conditions appears possible without impacting abutters. Due to the lack of high traffic volumes, it is likely that traffic can easily be detoured around either potential restoration site during construction. In 1998, the Town had applied for a grant to replace both culverts with the Town contributing in-kind services but was not approved based on the need to consider the Ferry Road crossing in a more comprehensive approach to restoration within the Rings Island Marsh.

The locations and inverts of existing underground utilities will likely influence the options available for replacement, including a large telephone duct bank on First Street. For initial cost estimates we assumed a 36 in RCP pipe. Further details regarding locations of underground utilities will likely influence other culvert options such as elliptical or multiple pipes. Construction costs associated with replacing each culvert are estimated to be in the range of \$300,000 to \$550,000 for both culverts.

Another, more promising option would involve ditch enhancements to establish a better tidal connection to the larger marsh to the north coupled with the creation of a larger opening under Ferry Street (see Site 329). Construction costs associated with this option are estimated to be \$60,000 which includes creation or enhancement of existing ditch network within the marsh along with maintenance and shorter-term repairs of the culvert under First Street.

**Restoration Potential:** The replacement of culverts under First and March Road is considered to have low restoration potential based primarily on the relatively high costs in context with the limited ecological benefits and small size of the upstream marsh. The high costs are influenced primarily by the fact that two culverts need to be replaced and their associated utility relocation. However, incorporating drainage improvements in associated with a replacement structure at the Ferry Road crossing (Site 329) is more promising. Despite the failing condition of the existing culvert under First Street, the measured tidal restriction upstream of March Road is substantially less than the recorded restriction upstream of Ferry Road. This finding suggests that replacement of the First Street culvert (which will be necessary near term) with an 18 in culvert similar to March Street or the simple removal of existing obstructions to the First Street culvert may provide measurable benefits. Although replacement of the First Street culvert is included in the Town's Capitol Improvement Program, work is not likely within the next 5 years (D. Levesque, DPW Director, pers. comm.). Further studies of restoration potential should include:

- more detailed inspection of the First Street culvert following the removal of obstructions,
- an investigation of pore water salinities upstream and downstream of road crossings to better understand vegetation responses to salinities levels
- an investigation of potential sources of stormwater contributions,



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- more detailed survey and topographic information on low-lying abutters and existing utilities, and
- coordination with the Town, property owners and other parties to be involved with Site 328.



Datum: NGVD 29



**Photo 1 - First Street Viewing East**



**Photo 2 - Downstream View of Marsh**





**Photo 3 - View Upstream of First Street**



**Photo 4 - March Road Viewing East**





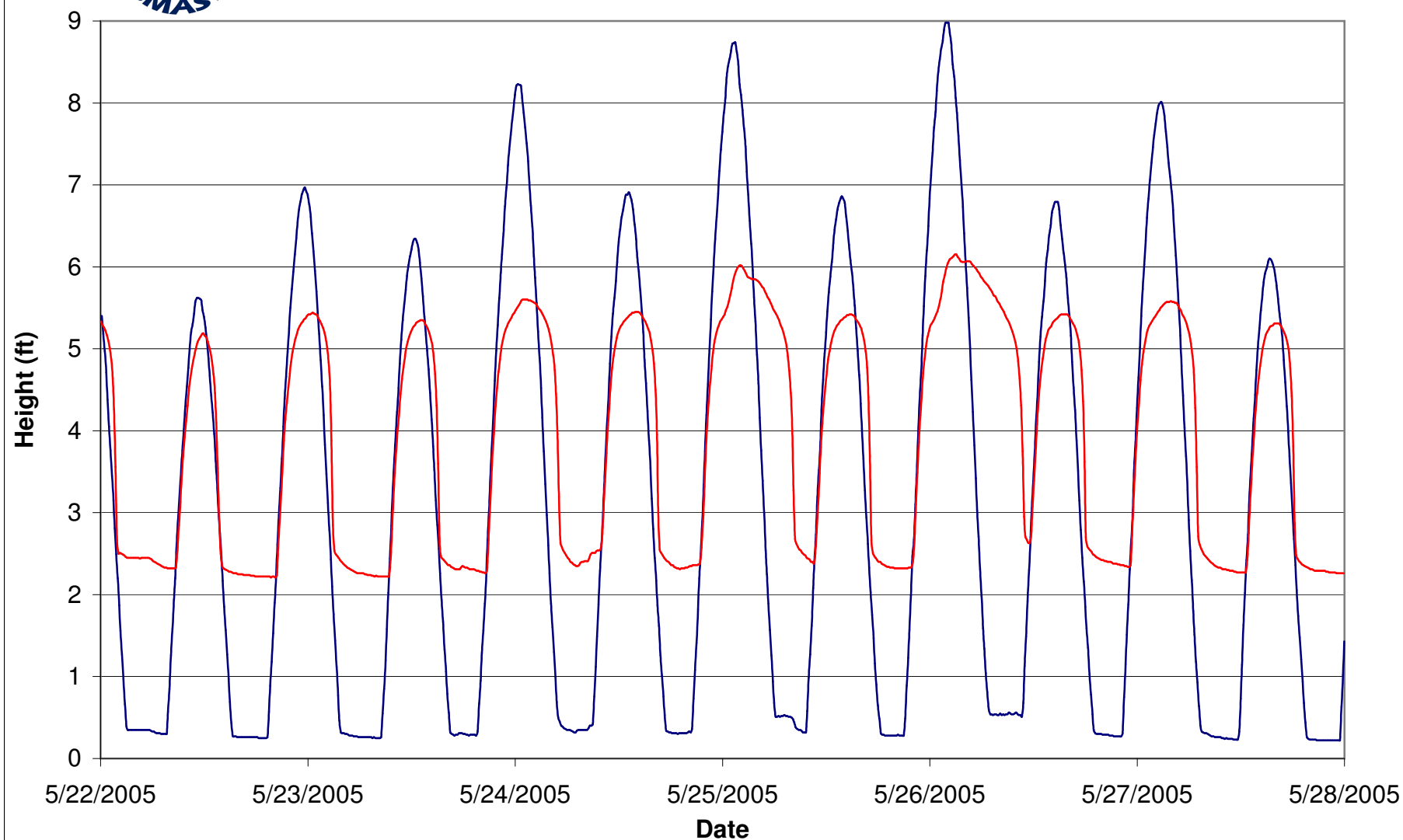
**Photo 5 - Upstream Marsh Viewed from March Road**





# Site 328: Rings Island, 1st St./March Road, Salisbury, MA

Down Stream  
Up Stream





# Great Marsh Coastal Wetlands Restoration Planning

## Rapid Field Assessment

Site # 328

Rings Island - First Street and March Road



### Site Information

Site ID:

Site Name:

Municipality:

Location:

Adjacent Waterbody:

### Structure / Channel:

Overall Condition:

Life Expectancy (Years):

Road Condition:

Structure Type:

Structure Age (Years):

Structure 1 Width (Feet):

Structure 1 Length (Feet):

Structure 2 Width (Feet):

Structure 2 Length (Feet):

Skew (Degrees):

Cover (Feet):

Scour Protection: ☐

Adequately Aligned: ☒

Headwall Type:

Headwall Condition:

### Affected Area (Acres)

Mudflat/Open Water:  Total Area:

Salt Marsh:

Other Wetland:  Other Description:

Other:

### Impairment(s)

Tidal Restriction ☒ Fill ☐

Obstructed Ditch(es) ☐ Invasive Species ☒

Impoundment ☐ Pollution / Siltation ☒

Severity of Impairments

### Ecological Integrity / Habitat Value

Surrounding Land Use %

Commercial / Industrial

Residential

Agricultural

Undeveloped

Severity of Impairment(s)

Invasive Plant Cover:

Extent of Wooded Buffer:

Habitat Connectivity:

NHESP Estimated Habitats of Rare Wildlife: ☐

NHESP Priority Habitats of Rare Species: ☐

NHESP BioMap Core Habitat: ☒

NHESP BioMap Supporting Natural Landscape: ☒

ACEC: ☒

Anadromous Fish: ☐

Shellfishing Suitability: ☒

Barriers to Fish Passage

### Project Type

Roadway Culvert(s) ☒ Obstructed Ditches ☐

Bridge ☐ Fill ☐

Berm ☐ Other

### Evidence of Restriction

Gauge Data ☒ Impounded Flow ☐

Downstream Scour Pool ☒ Obstructed Flow ☒

Upstream Scour Pool ☐ Invasive Species ☒

Bank Erosion ☒ Ponded Conditions ☐

Slumping ☐ Subsidence ☐

**Construction Logistics / Feasibility**

Traffic Volume	<input type="text" value="Medium"/>
Detour Potential	<input checked="" type="checkbox"/>
Site Access	<input type="text" value="Good"/>
Staging Areas	<input checked="" type="checkbox"/>
Fill Material Concern	<input type="text" value="Minimal"/>
Low Lying Property Concerns	<input type="text" value="Moderate"/>
Overhead Utility Constraint	<input type="text" value="Moderate"/>
Underground Utilities	
Water <input checked="" type="checkbox"/>	Telephone <input checked="" type="checkbox"/>
Gas <input checked="" type="checkbox"/>	Sewer <input checked="" type="checkbox"/>
Electric <input type="checkbox"/>	Drainage <input type="checkbox"/>
Permitting Complexity	<input type="text" value="Medium"/>
Local Support	<input type="text" value="Yes"/>
Feasibility Cost	<input type="text" value="20,000"/>
Design Cost	<input type="text" value="35,000"/>
Permitting Cost	<input type="text" value="25,000"/>
Construction Cost	<input type="text" value="550,000"/>
Total Cost	<input type="text" value="630,000"/>
Relative Cost/Acre	<input type="text" value="217,000"/>

**Socioeconomic**

<b>Recreation</b>	<b>Education</b>
Public Access: <input type="checkbox"/>	Schools Nearby: <input type="checkbox"/>
Watercraft / Portage: <input type="checkbox"/>	Ongoing Research: <input type="checkbox"/>
Wildlife Viewing: <input type="checkbox"/>	Education / Outreach Potential: <input type="text" value="Low"/>
	Safety Concerns (Access): <input type="text" value="Medium"/>
<b>Uniqueness / Heritage Value</b>	
Rare Species Habitat: <input type="checkbox"/>	
ACEC: <input checked="" type="checkbox"/>	
Cultural Resource Features <input type="checkbox"/>	
Urban Viewscape Value: <input type="text" value="None"/>	
Urban Habitat Value: <input type="text" value="None"/>	

**Tide Surveys**

	<i>Start:</i>		<i>Finish:</i>
<b>Dates of 1st Survey:</b>	<input type="text" value="5/18/2005"/>	-	<input type="text" value="6/3/2005"/>
Date of Highest Tide:	<input type="text" value="5/26/2005"/>		
Max Measured Tidal Dampening:	<input type="text" value="2.83"/>		
Percent of Tidal Prism:	<input type="text" value="33"/>		
Measured Delay:	<input type="text" value="1 hr 5 min"/>		
	<i>Start:</i>		<i>Finish:</i>
<b>Dates of 2nd Survey:</b>	<input type="text"/>	-	<input type="text"/>
Date of Highest Tide:	<input type="text"/>		
Max Measured Tidal Dampening:	<input type="text"/>		
Percent of Tidal Prism:	<input type="text"/>		
Measured Delay:	<input type="text"/>		

**Summary**

Uniqueness / Heritage Value:	<input type="text" value="Medium"/>	Ecological Integrity:	<input type="text" value="Low"/>
Recreational Value:	<input type="text" value="Low"/>	Logistics / Feasibility:	<input type="text" value="Medium"/>
Educational Value:	<input type="text" value="Low"/>		
<b>Restoration Potential:</b>			<input type="text" value="Low"/>